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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/563,554
Filing Date: April 14, 2006
Appellant(s): FISCHER ET AL.

James J. Livingston, Jr. (Reg. No. 55,394)
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 06/08/10 appealing from the Office action mailed 11/09/09.

(1) Real Party in Interest

The examiner has no comment on the statement, or lack of statement, identifying by name the real party in interest in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The following is a list of claims that are rejected and pending in the application:

Claims 1-6, 9, 11 and 13-18 are pending.

(4) Status of Amendments After Final

The examiner has no comment on the appellant's statement of the status of amendments after final rejection contained in the brief.

(5) Summary of Claimed Subject Matter

The examiner has no comment on the summary of claimed subject matter contained in the brief.

(6) Grounds of Rejection to be Reviewed on Appeal

The examiner has no comment on the appellant's statement of the grounds of rejection to be reviewed on appeal. Every ground of rejection set forth in the Office action from which the appeal is taken (as modified by any advisory actions) is being maintained by the examiner except for the grounds of rejection (if any) listed under the

subheading "WITHDRAWN REJECTIONS." New grounds of rejection (if any) are provided under the subheading "NEW GROUNDS OF REJECTION."

(7) Claims Appendix

The examiner has no comment on the copy of the appealed claims contained in the Appendix to the appellant's brief.

(8) Evidence Relied Upon

5,274,817	Stahl	12-1993
5,274,817	Stahl	12-1993
2004/0158729	Szor	08-2004
5,956,479	McInerney et al.	09-1999
2003/0188174	Zisowski	10-2003
2002/0166067	Pritchard et al.	11-2002

Choi et al. "A New Stack Buffer Overflow Hacking Defense Technique with Memory Address Confirmation", ICICS 2001, pages 146-159.

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-2, 5-9, 11, 13-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stahl US 5,274,817 in view of Szor US 2004/0158729 and in view of Choi et al. "A New Stack Buffer Overflow Hacking Defense Technique with Memory Address Confirmation", ICICS 2001, pages 146-159 (hereinafter Choi).

As per claim 1:

Stahl teaches a method of making the execution of a computer program secure (*col. 1, line 36; ensuring that the integrity of the stack during program execution*), the method comprising:

a processor performing: (*col. 1, lines 55-67; col. 4, lines 52-55)*

a step of stacking a predetermined value in an instruction stack of the program; (*col. 1, lines 55-67; col. 4, lines 52-55; storing signature word in the stack*) and

a step of unstacking said stack, wherein if said predetermined value is unstacked, the anomaly processing function is executed. (col. 1, lines 62-67; col. 4, lines 57-64; col. 5, lines 8-17; *if the signature word stored on the stack matches the entry address of the subroutine which was just execute. ..if the compared values do not match, it is assumed that an error has occurred and control is passed to the block where a software interrupt is executed*)

Stahl does not explicitly disclose said predetermined value being an address of an anomaly processing function, during the normal execution of the program, a step of removing said predetermined value from the instruction stack without executing the anomaly processing function. Szor in analogous art, however, discloses predetermined value being an address of an anomaly processing function. (figure 2, [0033]-[0040],

[0050]-[0056],[0058]-[0061] Therefore it would have been obvious to one ordinary skill in the art at the time the invention was made to modify the method disclosed by Stahl with Szor in order to prevent unauthorized access by malicious hackers or replicating malware. ([0040]; Szor)

Both references do not explicitly disclose during the normal execution of the program, a step of removing said predetermined value from the instruction stack without executing the anomaly processing function. Choi in analogous art, however, discloses during the normal execution of the program, a step of removing said predetermined value from the instruction stack without executing the anomaly processing function. (page 150-151; Section 3.1 and Section 3.2) Therefore it would have been obvious to one ordinary skill in the art at the time the invention was made to modify the method disclosed by Stahl and Szor with Choi in order to allow the function progress normally if the predetermined value has not been changed. (page 150, Choi)

As per claim 2:

The combination of Stahl, Szor and Choi teaches all the subject matter as discussed above. Stahl further discloses stacking and unstacking steps are respectively associated with elements of at least one subset of instructions of said program. (*col. 4, lines 60-col, 5, lines 37; a branch to the subroutine is executed, the return address is stored on the stack …when the return instruction is encountered, the return address is retrieved from the stack*)

As per claim 5:

The combination of Stahl, Szor and Choi teaches all the subject matter as discussed above. Stahl further discloses said program is written in a programming language including a first instruction whose execution implements said stacking step and/or a second instruction whose execution implements said unstacking step. (col. 2, line 61-col 4, line 21; col. 4, lines 60-col, 5, lines 37)

As per claim 6:

The combination of Stahl, Szor and Choi teaches all the subject matter as discussed above. Stahl further discloses second instruction terminates said program or a subroutine of said program. (col. 2, line 61-col 4, line 21; col. 4, lines 60-col, 5, lines 37)

As per claim 7:

The combination of Stahl, Szor and Choi teaches all the subject matter as discussed above. Stahl further discloses said predetermined value is representative of a subset of critical instructions of said program. (col. 2, line 61-col 4, line 21; col. 4, lines 60-col, 5, lines 37)

As per claim 8:

The combination of Stahl, Szor and Choi teaches all the subject matter as discussed above. Stahl further discloses it includes an anomaly processing step executed if, during said unstacking step, a value other than said predetermined value is unstacked. (col. 2, line 61-col 4, line 21; col. 4, lines 60-col, 5, lines 37)

As per claim 9:

The combination of Stahl, Szor and Choi teaches all the subject matter as discussed above. Stahl further discloses wherein said program includes at least one call to a subroutine, characterized in that said stacking step is effected before said call and said predetermined value is eliminated from said stack during execution of said subroutine. (col. 2, line 61-col 4, line 21; col. 4, lines 60-col, 5, lines 37)

As per claim 11:

The combination of Stahl, Szor and Choi teaches all the subject matter as discussed above. Stahl further discloses wherein said programming includes at least one call to a subroutine, characterized in that said stacking step is effected during execution of said subroutine and said predetermined value is eliminated from said stack after execution of said subroutine. (col. 2, line 61-col 4, line 21; col. 4, lines 60-col, 5, lines 37)

As per claim 13:

The combination of Stahl, Szor and Choi teaches all the subject matter as discussed above. Stahl further discloses a computer readable information recording medium with a computer program recorded thereon, said information recording medium totally or partially removable, in particular a CD-ROM, or a magnetic medium, such as a hard disk or diskette wherein it includes instructions of the computer program for implementing a method according to claim 1 when that program is loaded into and executed by an electronic data processing system. (col. 2, line 61-col 4, line 21; col. 4, lines 60-col, 5, lines 37)

As per claim 14:

The combination of Stahl, Szor and Choi teaches all the subject matter as discussed above. Stahl further discloses a computer readable information recording medium with a computer program recorded thereon, said computer program including instructions for executing a method according to claim 1 when that program is loaded into and executed by an electronic data processing system. (col. 2, line 61-col 4, line 21; col. 4, lines 60-col, 5, lines 37)

As per claim 15:

The combination of Stahl, Szor and Choi teaches all the subject matter as discussed above. Stahl further discloses electronic entity that has been made secure wherein it includes means for implementing a method according to claim 1. (col. 2, lines 15-33)

1. Claims 3-4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stahl US 5,274,817 817 in view of Szor US 2004/0158729 and in view of Choi et al. "A New Stack Buffer Overflow Hacking Defense Technique with Memory Address Confirmation", ICICS 2001, pages 146-159 (hereinafter Choi) and further in view Mclnerney et al. (hereinafter Mclnerney) US 5,956,479.

As per claim 3:

The combination of Stahl, Szor and Choi teaches all the subject matter as discussed above. None of the references explicitly disclose elements are respectively an opening bracket and a closing bracket in a system of brackets. Mclnerney in analogous art, however, discloses that elements are respectively an opening bracket

and a closing bracket in a system of brackets. *(col. 15, lines 12-21; set-up instruction map for function execution, ... such as opening and closing brace)* Therefore it would have been obvious to one ordinary skill in the art at the time the invention was made to modify the method disclosed by Stahl, Szor and Choi with McInerney in order to set-up instruction map for a function execution to some predefined source position, such as opening and closing brace. (col. 15, lines 15-21; McInerney)

As per claim 4:

The combination of Stahl, Szor, Choi and McInerney teaches all the subject matter as discussed above. Stahl further discloses in that said unstacking step is associated with a return instruction of said program or a subroutine of said program. (col. 4, lines 60-col, 5, lines 37)

2. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Stahl US 5,274,817 in view of Szor US 2004/0158729 and in view of Choi et al. "A New Stack Buffer Overflow Hacking Defense Technique with Memory Address Confirmation", ICICS 2001, pages 146-159 (hereinafter Choi) and further in view of Zisowski US 2003/0188174.

As per claim 16:

The combination of Stahl, Szor, Choi and McInerney teaches all the subject matter as discussed above. None of the references explicitly disclose the electronic entity is a smart card. Zisowski in analogous art, however, discloses that the electronic entity is a smart card. (page 2, pp. 17 and 30) Therefore it would have been obvious to one ordinary skill in the art at the time the invention was made to modify the method

disclosed by Stahl, Szor and Choi with Zisowski in order to provide a system for detecting a possible malicious program that allows the identification of missing, added or modified program modules to a computer program running on microcontrollers. (page 2, pp. 29-30; Zisowski)

3. Claims 17-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stahl US 5,274,817 in view of Szor US 2004/0158729 and in view of Choi et al. "A New Stack Buffer Overflow Hacking Defense Technique with Memory Address Confirmation", ICICS 2001, pages 146-159 (hereinafter Choi) and further in view of Pritchard et al. (hereinafter Pritchard) US 2002/0166067.

As per claims 17 and 18:

The combination of Stahl, Szor, Choi and McInerney teaches all the subject matter as discussed above. None of the references explicitly disclose wherein the anomaly processing function is adapted to destroy an operating system of said smart card. Pritchard in analogous, art, however, discloses wherein the anomaly processing function is adapted to destroy an operating system of said smart card. ([0073], [0087]) Therefore it would have been obvious to one ordinary skill in the art at the time the invention was made to modify the method disclosed by Stahl, Szor and Choi with Pritchard in order to provide automatically remove the anomaly by a clean version of the operating system. ([0073]; Pritchard)

(10) Response to Argument

Appellant argued that if one is to accept, arguendo, that Choi discloses the feature of the claim, then Choi would teach a feature exactly opposite of that posed by Stahl. As such the two references teach away from combination.

Stahl teaches ensuring the integrity of the stack during program execution including storing a signature word on the stack, the signature word corresponding to an entry address code in memory for the subroutine and comparing the signautre word stored on the stack with the subroutine entry address code; passing control to the return address if the compared values are equal; and executing a software iterrupt if the compared values are not equal. (col. 1, lines 55-67) Stahl explicitly teaches that if the compared value are not equal executing a software interrupt. Stahl does not explicitly disclose wherein if said predetermined value is unstacked the anomally processing function is executed. Choi teaches protecting systems against stack attacks by inserting a canary word to the stack just before, the return address when a function has been called, and when the function returns, StackGuard checks the canary word. If the canaray word has not been changed, then the function progresses normally. Because both Stahl and Choi teach methods for protecting the integrity of stack during program execution against malicious modifications, it would have been obvious to one skilled in the art to substitute one method for the other to achieve the predictable result of protecting a system against stack attacks by preventing modifying the return address from the stack area. (*KSR International Co. v. Teleflex, Inc.*, 550 U.S. 398, 82 USPQ2d 1385 (2007)) As discussed above, the references do not teach away from the combination because both Stahl and Choi teach ensuring integrity of stack during

program execution Stahl by comparing the signature word stored on the satck and Choi by inserting and checking a canary word and progressing with normal exeuction if the canary work has not been changed. Therefore, the references do not teach away from the combination and it would have been obvious to one ordinary skill in the art to combine Stahl with Choi.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

/Shewaye Gelagay/

Examiner, Art Unit 2437

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